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ABSTRACT

This paper describes a computerized system designed and developed for the purpose of simplifying and improving scoring and summarizing the achievement of students participating in Title I programs. The goal of the evaluation and reporting system is to provide meaningful and comparable information about Title I projects at the school building, school district, state, and federal levels. The data are reported from each Title I project. These data are entered on coding sheets and show identifying information for the school district, the building, and each student within the building. Developed originally for use in Iowa, the system is presently being used in some form in four states. Local districts report raw scores to the State Department of Education, along with proper test identification. The system enters raw scores and other identifying information and produces summary reports by school building and district. It also gives a diagnosis of selected evaluation procedures and what percent of students were affected if improper procedures were used. The system has both reduced the reporting burden for local districts and increased the accuracy of the aggregated state reports. (Author/PN)

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A COMPUTERIZED SYSTEM FOR THE EVALUATION OF ACHIEVEMENT IN TITLE I

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ABSTRACT

This paper describes a computerized system for the evaluation of achievement in Title I programs. Developed originally for use in Iowa, it is presently being used in some form in four states. Local districts report raw scores to the State Department of Education, along with proper test identification. The system enters raw scores and other identifying information and produces summary reports by school building and district. It also gives a diagnosis of selected evaluation procedures and what percent of students were affected if improper procedures were used.

The system has both reduced reporting burden for local districts and increased the accuracy of the aggregated state reports.

This paper describes a system designed and developed for the purpose of simplifying and improving scoring and summarizing the achievement of students participating in Title I programs. The system which we describe is presently in use in some form in four states, and is being considered for use in 6 others. It was developed for use in the state of Iowa, and has been in use in that state for almost 4 years.

Background on the Title I Evaluation and Reporting System

Title I programs are established with federal funds allocated for special or additional training beyond the regular classroom primarily in the basic skills of reading, mathematics, and language arts. Students are selected for Title I programs based on factors that include family income, scores on tests, and teacher recommendations. The impact of these programs must, by federal mandate, be evaluated and the result of this evaluation reported by the state to federal agencies.

The goal of the evaluation and reporting system is to provide meaningful and comparable information about Title I projects at the school building, school district, state, and federal levels. The data are reported from each Title I project. These data are entered on coding sheets and show identifying information for the school district, the building, and each student within the building. Information reported includes codes for the name, edition, form, level, and subtest of the tests used, the date tested, the number of teachers in the project, and individual scores on the tests.

Participation statistics are aggregated (combined) for all students in Title I programs, but achievement outcomes are compiled only for those students with valid pretest and posttest scores. Project impact is measured by performance of participants on achievement tests. Typically, students are tested in the fall (pretest) and again in the spring (posttest) after being in Title I classes for six or seven months.

The various standardized tests available are broken down by form, level, and subtest. Forms are differing versions of similarly normed tests, level indicates level of achievement for which the particular version is recommended, and subtest focusses on a particular content area. Under most circumstances the same form and level of a given test should be administered at pretest and posttest times.

As part of the Federal Title I reporting requirements, Title I achievement scores must be reported as Normal Curve Equivalents (NCEs). The test score arrived at most directly is the raw score, found by simply adding the number of items on the test answered correctly. However, raw scores are seldom if ever reported, because they provide no information that can be used in comparing achievement of different children. Instead, standardized tests provide norms tables which enable the user to convert the raw score to a percentile ranking, a grade equivalent or a standard score. Since one of the goals of Title I evaluation was to be able to compare outcomes across different states, a common metric which would allow such comparisons was developed by RMC Inc. (Tallmadge, 1976). This metric is known as the Normal Curve Equivalent or NCE. NCEs are most closely related to percentiles. Percentile ranking shows the percentage

of the norming sample scoring below a given raw score. NCE scores form a distribution which matches percentiles at the 1, 50, and 99 levels but, unlike percentiles, distributes the intervals between scores evenly. For this reason NCE scores have been chosen as the metric for Title I evaluation.

Evaluation measures the impact of the project. Impact is defined as a gain in the mean NCE score of the project from pretest to posttest. This is actually a measure of the difference between the students' NCE scores on the posttest and the scores the students would be expected to achieve without the benefit of Title I instruction. In effect, by converting raw scores to NCEs the nationally normed sample becomes a "no-treatment control group" against which the Title I student's progress is measured. For this reason, it is essential to good evaluation that pretest and posttest be given within the prescribed time limits in respect to the date the test was normed.

Although the impact of Title I is measured at the project level, the following example shows how the NCE gain is computed for an individual student. A student selected for a Title I project in remedial reading is given a nationally normed reading test in the fall. His raw score is 62, which converts to the 22nd percentile, which converts to an NCE score of 34. In the spring he takes the same test again and reaches percentile 30 which converts to an NCE score of 39. NCE gain is the difference between 39 and 34, or 5 NCE's.

The Iowa Title I Computerized Evaluation System

Thousands of children participate annually in the Title I programs in the state of Iowa. To meet the goals of the Title I System without computer use has meant a time consuming manual task. Each record would have to be manually edited to convert the raw scores to NCE's. Additional test information regarding norm dates, appropriate use of out-of-level testing, and the like, would have to be appended to the record. Tedious manual checks of each data field would have to be made; and an equally tedious compilation of statistics would need to be made. The greatest disadvantage in this manual effort would be in the area of quality control. At any point in the process, human error is very likely to occur. Several papers on quality of Title I data identify the extent and seriousness of these errors (See, for example, Bozler, 1978; Crane and Maye, 1980; Elman, 1981; and Finley, 1981). Further, the volume and level of reporting would make the manual preparation of the feedback reports an enormous task. By contrast, the computerized system quickly and easily screens out most reporting errors and omissions, and easily compiles and prints the statistics for the various feedback reports.

The Iowa Title I Evaluation System begins at the project/school district level with the administration of tests by teachers to Title I students. These tests are usually administered in the fall and again in the spring. Student raw scores on the tests are entered on coding sheets along with other pertinent data including an identifying number for the school district, the building, and each student in the project. The data

include codes for the name, form, level, and subtest of each test used, the dates tested, the number of teachers in the project and individual scores on the tests. Figure 1 is a copy of the coding sheet used in Iowa to collect achievement information. These student coding sheets, accompanied by a summary building-level coding sheet (see Figure 2) are then forwarded on to the state Title I agency.

Figure 3 graphically shows how information flows through the Iowa Title I Evaluation System, that is, what happens to the coding sheets once they reach the state department of education. When the coding sheets are received by the state agency, they are manually screened for any errors or omissions. The records are then keypunched onto cards and transferred to tape. The resultant tape file of student data is then run through the MERGE program which merges the forms information into single student records.

Insert Figures 1 through 3 about here

An error report is created by this program to aid in the correction of records with errors. These records must be manually corrected (i.e. there is no computer program to correct them). The corrected records will then be resubmitted to the MERGE program. This cycle can be continued over and over until all errors have been corrected.

Processing of data continues in the RAWCON program. The merged data set is run through this program and additional testing information is

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DPI USE ONLY

FORM C (Read-RAW), Side 1
Title I Evaluation Information for One Grade

(1-2) ① [1][1]

(3-10) 1. [ ][ ][ ][ ] Local Education Agency Code

(11-17) 2 [ ][ ][ ][ ] Project Code

(18) 3. [ ] Number of Aides

(19-22) 4. [ ][ ][ ][ ] Building Number

(23-24) 5. [ ][ ] Grade

(25-27) 6. [ ][ ][ ] Group Code

(28-30) 7. [ ][ ][ ] Minutes of Instruction Time Per Week

(31-33) 8. [ ][ ][ ] Total Number of Days

9. Student (Stu.)/Instructor (Inst.) Information

	# Stu.	# Inst.		# Stu.	# Inst.
(34-41) Group 1			Group 6		
(42-49) Group 2			Group 7		
(50-57) Group 3			Group 8		
(58-65) Group 4			Group 9		
(66-73) Group 5			Group 10		

② (18-21) 10. Pretest Information

Test Name and Year _____
Form _____
Level _____
Subtest or Total Score _____

(22) 11. [1] Pretest Score Type Code (Raw Score = 1)

(23-26) 12. [ ][ ][ ][ ] Pretest Norm Date
Month Day

(27-32) 13. [ ][ ][ ][ ][ ][ ] Pretest Administration Date
Month Day Year

(33-36) 14. Posttest Information

Test Name and Year _____
Form _____
Level _____
Subtest _____

(37) 15. [1] Posttest Score Type Code (Raw Score = 1)

(38-41) 16. [ ][ ][ ][ ] Posttest's Norm Date
Month Day

(42-47) 17. [ ][ ][ ][ ][ ][ ] Title I Posttest Administration Date
Month Day Year

(48-49) 18. [ ][ ] Total Number of Title I Students in this Grade and who are Listed on Side 2 of this Form that Received any Title I Instruction.

(50-51) 19. [ ][ ] How many of these Students (Listed on Side 2) have both a Pretest and Posttest Score?

(52-53) [ ][ ] 20. Student Selection Test Information For This FORM C

(54-57) [ ][ ][ ][ ] Name of Test(s) and Date(s) of Administration

Test 1 _____ _____
Name&Yr. Form Level Subtest Mon. Day Yr.

Test 2 _____ _____
Name&Yr. Form Level Subtest Mon. Day Yr.

How many students who are listed on Side 2 of this form were selected for Title I participation using Test 1? _____ Test 2? _____

Figure 1 : Sample Form C, Side 1.

FORM C (Read-Raw), Side 2
Title I Evaluation Information For One Grade

REPORT RAW SCORE DATA ONLY

	PUPIL ID	PRETEST SCORE	POSTTEST SCORE	DPI USE ONLY
(3) (14-19)	1.			(50-55)
(20-25)	2.			(56-61)
(26-31)	3.			(62-67)
(32-37)	4.			(68-73)
(38-43)	5.			(74-49)
(44-49)	6.			(6) (14-19)
(50-55)	7.			(20-25)
(56-61)	8.			(26-31)
(62-67)	9.			(32-37)
(68-73)	10.			(38-43)
(74-79)	11.			(44-49)
(4) (14-19)	12.			(50-55)
(20-25)	13.			(56-61)
(26-31)	14.			(62-67)
(32-37)	15.			(68-73)
(38-43)	16.			(74-49)
(44-49)	17.			(7) (14-19)
(50-55)	18.			(20-25)
(56-61)	19.			(26-31)
(62-67)	20.			(32-37)
(68-73)	21.			(38-43)
(74-79)	22.			(44-49)
(5) (14-19)	23.			(50-55)
(20-25)	24.			(56-61)
(26-31)	25.			(62-67)
(32-37)	26.			(68-73)
(38-43)	27.			(74-79)
(44-49)	28.			

PUPIL ID	PRETEST SCORE	POSTTEST SCORE
29.		
30.		
31.		
32.		
33.		
34.		
35.		
36.		
37.		
38.		
39.		
40.		
41.		
42.		
43.		
44.		
45.		
46.		
47.		
48.		
49.		
50.		
51.		
52.		
53.		
54.		
55.		

Figure 1 : Sample Form C, Side 2.
continued

DPI USE ONLY

Do not write

in this space

FORM B (Read)

LEA and Reading Project Summary Sheet

Directions: Refer to pages 29 - 30 in the booklet Instructions for Submitting Annual Evaluation Report FY 1981.

(1-2) BLANK

(3-6)

(7-10) 1. [ ][ ][ ][ ] DPI Local Education (LEA) Code

(11-13)

(14-17) 2. [ ][ ][ ][ ] Reading Project Code

(18) 3. [1] Subject Code (Reading = 1)

(19-26) 4. [ ][ ][ ][ ][ ][ ][ ][ ]. Reading Project (K-12) Cost from Title I Funds Only (to nearest whole $).

(27-34) 5. [ ][ ][ ][ ][ ][ ][ ][ ]. Total Reading Project (K-12) Cost from T Funds and LEA Supplemental Funds (to nea whole $).

(35-39) 6. [ ][ ][ ][ ][ ] Total LEA Enrollment (K-12)

(40-44) 7. [ ][ ][ ][ ][ ] Total Title I Reading Project Enrollment (K-12)

Figure 2: Sample Form B.

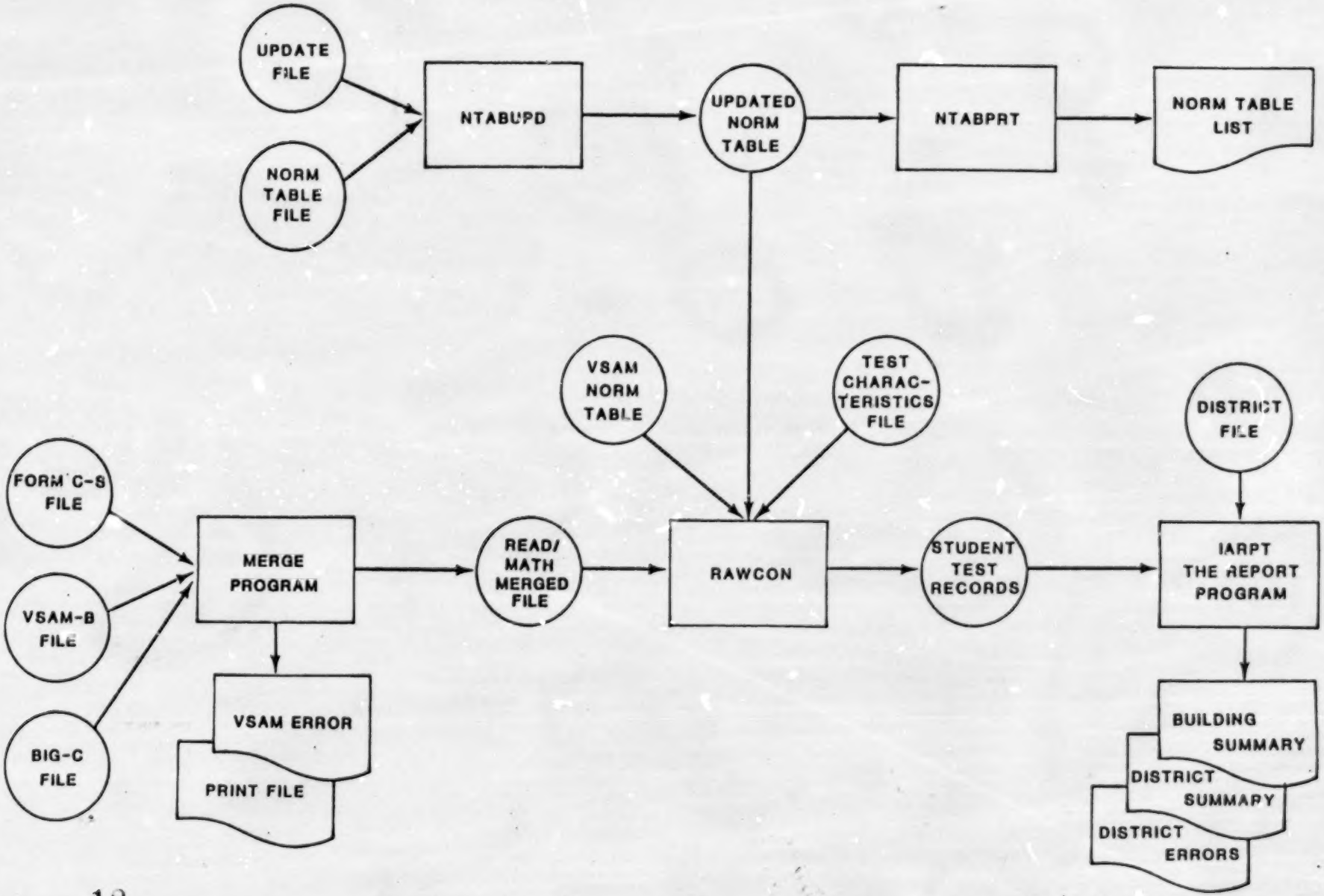

Figure 3: Iowa Title I system.

added to the record. This information comes primarily from a computer table called the Test Characteristics File which lists important information about the various tests the teachers have administered to their students. Examples of information added are the nominal norm date of the test, whether norms for the test are empirical, and the actual norm date for the test--all vital pieces of information needed to further evaluate the student test data. If the program cannot attach this information to the record (which happens if the test in question is not in the system, or if the teacher-supplied information is ambiguous so that the appropriate Test Characteristics record cannot be accessed), error flags are set in the record and further processing of the test data will be limited. RAWCON also converts the reported student test scores to NCE scores. An error/statistical report is produced by this program to detail any errors found, and to aid in the documentation of the processing.

The updated merged record file is then run through IARPT, the report program. The function of the IARPT program is to produce the various reports needed for Title I evaluation. These reports include building-level summary (for school and teacher feedback), district-level summary reports (for district-level feedback), and district-level error summaries. Examples of these reports are in Figures 4 to 6.

Insert Figures 4 through 6 about here

In addition to these programs, the Iowa System includes two other programs used to update (NTABUPD) and print (NTABPRT) the Norms Tables

STATE OF IOWA

SUMMARY OF TITLE I PROGRAM IMPACT PAGE 1

BUILDING LEVEL REPORT--1980-81 SCHOOL YEAR

DISTRICT: 4041 BUILDING CODE: 8108

SUBJECT MATTER AREA: READING

EVALUATION RESULTS

GRADE	TOTAL PARTIC-IPANTS	NUMBER PRE & POST	NUMBER WITH VALID SCORES	PERCENT WITH VALID SCORES	PRETEST MEAN NCE	PRETEST EQUIV-ALENT %ILE	POSTTEST MEAN NCE	POSTTEST EQUIV-ALENT %ILE	GAIN MEAN NCE GAIN
2	3	3	3	100%	54.5	59%	60.1	68%	+ 5.6
3	3	3	3	100%	38.3	29%	46.1	43%	+ 7.8
4	4	4	4	100%	46.0	42%	52.8	55%	+ 6.8
5	4	4	4	100%	27.9	15%	38.2	29%	+10.3
6	3	3	3	100%	29.7	17%	45.9	42%	+16.2

* * * * * S U M M A R Y * * * * *

OVERALL BUILDING EVALUATION RESULTS

TOTAL NUMBER OF PARTICIPANTS (GR. 2 - 12)	NUMBER OF STUDENTS WITH VALID TEST SCORES	PERCENT ANALYZED	PRETEST MEAN NCE	PRETEST EQUIV-ALENT %ILE	POSTTEST MEAN NCE	POSTTEST EQUIV-ALENT %ILE	GAIN MEAN BUILDING GAIN
17	17	100.0%	39.0	30%	48.2	47%	+ 9.2

Figure 4: Building Report - Page 1

STATE OF IOWA

SUMMARY OF TITLE I PROGRAM IMPACT PAGE 2

DISTRICT LEVEL REPORT--1980-81 SCHOOL YEAR

DISTRICT: 4043

SUBJECT MATTER AREA: READING

EVALUATION RESULTS

GRADE	TOTAL PARTIC-IPANTS	NUMBER PRE & POST	NUMBER WITH VALID SCORES	PERCENT WITH VALID SCORES	PRETEST MEAN NCE	PRETEST EQUIV-ALENT %ILE	POSTTEST MEAN NCE	POSTTEST EQUIV-ALENT %ILE	GAIN MEAN NCE GAIN
2	13	13	13	100%	32.9	21%	45.7	42%	+12.8
3	18	17	17	94%	35.8	25%	43.1	37%	+ 7.3
4	19	18	18	95%	34.0	22%	42.4	36%	+ 8.4
5	34	31	31	91%	41.2	34%	48.6	47%	+ 7.4
6	31	29	29	94%	10.1	3%	49.2	49%	+39.1

12

* * * * * S U M M A R Y * * * * *

OVERALL DISTRICT EVALUATION RESULTS

TOTAL NUMBER OF PARTICIPANTS (GR. 2 - 12)	NUMBER OF STUDENTS WITH VALID TEST SCORES	PERCENT ANALYZED	PRETEST MEAN NCE	PRETEST EQUIV-ALENT %ILE	POSTTEST MEAN NCE	POSTTEST EQUIV-ALENT %ILE	GAIN MEAN DISTRICT GAIN
115	108	93.9%	29.8	17%	46.5	43%	+16.7

Figure 5: District Report - Page 2.

SUMMARY OF EVALUATION PROCEDURES PAGE 3

DISTRICT LEVEL REPORT--1980-81 SCHOOL YEAR

DISTRICT: 4043 TOTAL NUMBER OF PARTICIPANTS 115
(GRADES 2-12 ONLY)

SUBJECT MATTER AREA: READING

NUMBER OF STUDENTS AFFECTED	EVALUATION PROCEDURE
115 (100%)	STUDENTS HAD NCES OR SCORES FROM A CONVERTIBLE TEST: YES
115 (100%)	TEST BATTERY USED AT PRETEST AND POSTTEST TIMES: SAME BATTERY
115 (100%)	SUBTEST USED AS PRETEST AND POSTTEST: SAME SUBTEST
108 (94%)	MISSING OR INCONVERTIBLE STUDENT PRETEST OR POSTTEST SCORES: NO
7 (6%)	YES
115 (100%)	STUDENTS SELECTED USING PRETEST: NO
115 (100%)	NORM DATES AND TEST ADMIN. DATES FOR PRETEST AND POSTTEST: ALL INFORMATION AVAILABLE
115 (100%)	PRETEST, POSTTEST GIVEN AT PROPER TIME RELATIVE TO NORM DATES: YES

SUMMARY OF EVALUATION PROCEDURES:
108 (94%) STUDENTS HAD DATA ACCEPTABLE FOR ANALYSIS
7 (6%) STUDENTS HAD DATA NOT ACCEPTABLE FOR ANALYSIS

Figure 6: District Error Summary – Page 3.

file.

The computer programs in the Iowa Title I Evaluation System are written in COBOL and designed to run on an IBM-370 (or compatible) system. Files are stored on standard labeled computer tapes.

In recent months work has been completed on the documentation of the system. A Technical Manual and User's Guide are available to assist users to operate, maintain, and enhance the system.

Some Data on System Impact

And what of Iowa's experiences with the system. Are they pleased with it? What has been the payoff for them? While we do not pretend to be able to speak for the Iowa Title I staff, there are some indices which we have collected which speak for themselves. Where score conversion and aggregation accuracy is concerned, the type of errors previously noted have been totally eliminated. Errors that have been discovered in the system have been attributed primarily to (a) errors or omissions in the norms tables; (b) inaccurate coding of test, form, level, and subtest; and (c) data entry errors. As errors have been discovered in the norms tables, they have been corrected. For the most part, errors of this type have been relatively minor considering the 15,000 tables available for access. Inaccuracy in test information coding will be detected automatically if the raw score is greater than the maximum score possible on the miscoded test. Visual scanning of the output may also detect "suspicious" looking scores that would lead one to question accuracy.

However, if the raw score can be converted and the output looks "reasonable," an error caused by inaccurate coding will go through the system undetected. The error rate from this source is unknown, and much depends on the pre-edit and post checking steps that are taken. Data entry errors are treated the same way as errors due to inaccurate coding. It is assumed that some error (unknown) will go through due to undetected errors in data entry. The amount of error will depend on the accuracy of entry verification steps that are taken.

Where validity is concerned, tables 1 through 7 summarize the results across years. In 1978, 27,905 student reading scores were submitted for processing (Table 1). Of those, 25,670 (92.0%) had used tests that were included in the system; 20,386 (73.1%) used tests in the system and had both a pretest and a posttest score; and 16,909 (60.6%) met all the criteria for inclusion in the analysis.[1]

Insert Tables 1 through 7 about here

In Table 2 looking at only the 20,386 students having both a pretest and posttest score that could be processed by RAWCON, the number and percent meeting each criterion for inclusion is given: (1) 99.7% had taken the same pretest as posttest; (2) 89.7% had been tested within 1 month of

---

[1] Criteria included (a) used same pretest and posttest battery, (b) tested within one month of empirical norm date, and (c) selection was ... based on the pretest.

Table 1

General Summary of How Iowa Students Were Selected for Analysis Based on Total Number of Students Whose Scores Were Submitted for Analysis

1978

Selection Categories	Reading		Mathematics	
	Number	Percent	Number	Percent
Total students whose scores were submitted for processing	27,905	100.0	5,203	100.0
Students having scores that could be processed[a]	25,670	92.0	4,361	83.8
Students having both a pretest and a posttest score	20,386	73.1	3,294	63.3
Students meeting criteria for inclusion in analysis[b]	16,909	60.6	2,421	46.5

[a] Only those student scores from among an estimated 95% of the most frequently used tests in Iowa could be processed. Score conversion tables were obtained for these tests. Raw scores reported for the remaining 5% could not be processed without the appropriate score conversion tables.

[b] Criteria included (a) tested with same test pre and post, (b) tested within one month of empirical norm date, and (c) selection not based on pretest.

Table 2

Summary of Number of Iowa Students Meeting Individual Criteria for Inclusion in Analysis Based on Number of Students Having Both a Pretest and a Posttest Score

1978

Selection Categories	Reading		Mathematics	
	Number	Percent	Number	Percent
Students having both a pretest and a posttest score	20,386	100.0	3,294	100.0
Students having the same pretest and posttest	20,320	99.7	3,286	99.8
Students tested within one month of empirical norm date	18,282	89.7	2,706	82.1
Students not selected with pretest	18,488	90.7	2,966	90.0
Students meeting criteria for inclusion in analysis[a]	16,909	82.9	2,421	73.5

[a] Criteria include (a) tested with same test pre and post, (b) tested within one month of norm date, (c) selection not based on pretest.

Table 3

General Summary of How Iowa Students Were Selected for Analysis Based on Total Number of Students Whose Scores Were Submitted for Analysis

1979

Selection Categories	Reading		Mathematics	
	Number	Percent	Number	Percent
Total students whose scores were submitted for processing	34,323	100.0	7,642	100.0
Students having scores that could be processed	32,928	95.9	6,863	89.8
Students having both a pretest and a posttest score and available norms tables[a]	19,607	57.1	3,230	42.3
Students meeting criteria for inclusion in analysis[b]	17,976	52.4	2,983	39.0

a The reduction over 1978 was due to the addition of norms tables for new editions of tests being only partially completed by the time the SEA report had to be run.

b Criteria included (a) tested with same test pre and post, (b) tested within one month of empirical norm date, and (c) selection not based on pretest.

Table 4

Summary of Number of Iowa Students Meeting Individual Criteria for Inclusion in Analysis Based on Number of Students Having Both a Pretest and a Posttest Score

1979

Selection Categories	Reading		Mathematics	
	Number	Percent	Number	Percent
Students having both a pretest and a posttest score	19,607	100.0	3,230	100.0
Students having the same pretest and posttest	19,594	99.9	3,198	99.0
Students tested within one month of empirical norm date	18,872	96.3	3,109	96.3
Students not selected with pretest	18,634	95.0	3,065	94.9
Students meeting criteria for inclusion in analysis[a]	17,976	91.7	2,983	92.4

[a] Criteria include (a) tested with same test pre and post, (b) tested within one month of norm date, (c) selection not based on pretest.

Table 5

General Summary of How Iowa Students Were Selected for Analysis Based on Total Number of Students Whose Scores Were Submitted for Analysis

1980

Selection Categories	Reading		Mathematics	
	Number	Percent	Number	Percent
Total students whose scores were submitted for processing	33,427	100.0	7,906	100.0
Students having scores that could be processed	33,197	99.3	7,466	94.4
Students having both a pretest and a posttest score	26,461	79.2	5,575	70.5
Students meeting criteria for inclusion in analysis[a]	25,483	76.2	5,277	66.7

[a] Criteria include: (1) have scores that could be processed, (b) have pre- and posttest scores, (3) tested with same test pre and post, (4) tested within one month of empirical norm date, and (5) selection not based on pretest.

Table 6

Summary of Number of Iowa Students Meeting Individual Criteria for Inclusion in Analysis Based on Number of Students Having Both a Pretest and a Posttest Score

1980

Selection Categories	Reading		Mathematics	
	Number	Percent	Number	Percent
Total students having both a pretest and a posttest score	26,461	100.0	5,575	100.0
Students having the same pretest and posttest	26,461	100.0	5,571	99.9
Students tested within one month of empirical norm date	25,683	97.1	5,298	95.0
Students not selected with pretest	26,196	99.0	5,537	99.3
Students meeting criteria for inclusion in analysis[a]	25,483	96.3	5,277	94.7

[a] Criteria include: (a) tested with same test pre and post, (b) tested within one month of empirical norm date, and (c) selection not based on pretest.

Table 7

Summary of Number and Percent of Students Meeting Validity Criteria in Iowa Over a Three Year Period[a]

Year Ending	Reading		Mathematics	
	Number	Percent	Number	Percent
1978	16,909	82.9	2,421	73.5
1979	17,976	91.7	2,983	92.4
1980	25,483	96.3	5,277	94.7

[a] Based on students who took a test included in the system (99% in 1980) and students having both pretest and post-test scores (79% in 1980).

the empirical norm date; and (3) 90.7% had not been selected on the pretest. The percent of students meeting all three criteria was 82.9%. This can be thought of as an index reflecting the extent to which the models have been correctly implemented.

Similar information is given for 1979 in Tables 3 and 4 and for 1980 in Tables 5 and 6. The overall picture is presented in Table 7 and shows progressive increases for reading from 82.9% in 1978 to 91.7% in 1979 and to 96.3% in 1980. Similarly, the index for mathematics goes from 73.5% in 1979 to 92.4% in 1978 to 94.7% in 1980.

Other interesting facts include the following:

Reading (over the three-year period)

1. The percentage of students tested within one month of the empirical norm date went from 89.7% to 97.1%.
2. The percentage of students not selected on the pretest rose from 90.7% to 99.0%.
3. The percentage of students having scores that could be processed (i.e., a test in the RAWCON system was used) went from 92.0% to 99.1%.

Mathematics (over the three-year period)

1. The percentage of students tested within one month of the empirical norm date went from 82.1% to 95.0%.
2. The percentage of students not selected on the pretest rose from 90.0% to 99.3%.
3. The percentage of students having scores that could be processed (i.e., a test in the RAWCON system was used) rose from 83.8% to 94.4%.

Development of the RAWCON system has not been without its problems. It depends heavily upon the proper coding of test identification (including

level, form, and subtest) and upon careful hand pre-editing of the data as well as checking of output. However, Iowa's experience attests to gains that can be made in assuring the quality of the vast majority of student data collected at the SEA level.

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